

REMARKS

Claims 1-21 are pending in the application. Claims 1-3, 11-14, 19, and 20 have been amended. Claims 5-7, 15-17, and 21 have been canceled. Claims 22 - 31 have been added. Claims 1-4, 8-14, 18-20, and 22-31 remain in the application.

Applicant traverses the examiner's objection to the Information Disclosure Statements filed on 7/28/2003 and 11/24/2003. A communication to this effect was mailed to the examiner on April 5, 2006. The examiner is requested to consider and initial the Form SB/08.

Claims 1-7, 11-17, 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al., (U.S. Patent 6,957,433) and in view of Jacobson et al. (U.S. Patent 5,392,244).

Claims 8-10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al. and Jacobson et al., as applied to claims 1 and 11 respectively, and further in view of Ofek et al. (U.S. Patent 6,598,134).

Rejection of claims 1-7, 11-17, 19-21 under 35 U.S.C. 103(a)

Claims 1, 11 and 19 are the independent claims. Exemplary claim 11, as amended herein, recites a process for providing differentiated classes of storage. The process includes the steps of providing a storage device having a plurality of storage locations and a logical block name space for organizing the storage locations, partitioning the plurality of storage locations into a plurality of regions having different levels of performance, and mapping the partitioned regions of the storage locations and aggregating logical block names of the partitioned regions having an identical level of performance to a subspace of the logical block name space.

Claims 1 and 19 recite substantially the same subject matter as claim 11.

Umberger ('433) discloses a system and method for adaptive performance optimization of data processing systems. In Umberger's system, some levels in a hierarchical RAID data storage system may deliver better I/O or data transfer performance than other levels. While Umberger discloses several of the features recited in claim 11, Umberger does not disclose or suggest, as admitted in the

Office Action, at least *mapping the partitioned regions of the storage locations and aggregating logical block names of the partitioned regions having an identical level of performance to a subspace of the logical block name space.*

Jacobson ('244) discloses a RAID management system in which a physical storage space 34 is referenced by two virtual storage views 40, 50. The regions 35 on disks 0, 1, 2, 3 of physical storage space 34 are preferably of equal size across the entire disk array. Storage view 40 represents a RAID level virtual view of the physical storage space 34 is the view of storage that identifies mirror and parity storage space. Application-level virtual view 50 is a view of storage presented to the user or application program. The virtual view 50 is represented by a table of references or pointers to allocation blocks in the view presented by RAID areas 40. The association depicted in Fig. 4 can be used, for example, to migrate blocks between different types of virtual blocks. (See description of Fig. 4 in col. 5, line 23, to col. 7, line 10).

Prior art disk storage devices treat all logical blocks as equivalent. Jacobson assigns the different (physical) storage locations 34 on a disk and the associated logical block names to different RAID levels in the RAID hierarchy. Jacobson does not teach or suggest that a level of performance is determined for the plurality of storage locations (for example, from an experimentally determined read/write speed), but instead assigns different RAID levels to different regions on the various disks. For example, RAID level 1 performs data mirroring and is very robust. RAID level 5 is not as robust, but it is more economical by requiring less hardware. These RAID levels have nothing to do with the experimentally determined performance of the physical storage locations.

The present invention improves over the prior art by recognizing that not all physical storage locations on a disk have the same performance. For this reason, it is proposed to determine the level of performance, such as access time, reliability of a portion of a disk, and to divide the range of logical block names of the drive into sections, wherein each section includes those logical block names which are associated with a substantially identical performance of the physical storage locations on the disk. Umberger and Jacobson, taken either alone or in combination, fail to teach these features, as recited in amended claims 1, 11 and 19.

The recited experimentally determined performance of the storage locations is therefore different from the assigned RAID performance and the operation of the different levels in a RAID architecture. However, RAID systems may also be able to take advantage of the achieved enhanced performance, as recited in dependent claims 3, 4, 13, and 14.

Claims 2-4 and 22-27 which depend from claim 1, claims 12-14 and 28-31 which depend from claim 11, and claim 20 which depends from claim 19 are also patentable for at least the reasons that claims 1, 11 and 19 are patentable.

Withdrawal of the rejection of claims 1-4, 8-14, 18-20, and new claims 22-31 under 35 U.S.C. 103(a) as being unpatentable over Umberger and Jacobson is thus respectfully requested.

Rejection of claims 8-10 and 18 under 35 U.S.C. 103(a)

Ofek discloses real time, on-line data migration from an existing storage device to a replacement storage device in a data processing system. Ofek's system is a block storage system, not a file system. Importantly, Ofek does not disclose the features recited in claims 1, 11 and 19 which are missing from the Umberger and Jacobson patents, so that claims 8-10 which depend from claim 1, and claim 18 which depends from claim 11, are patentable for at least the reasons that claims 1 and 11 are patentable.

In view of the above amendment, Applicant believes the pending application is in condition for allowance.

We believe that we have appropriately provided for fees due in connection with this submission. However, if there are any other fees due in connection with the filing of this Response, please charge our Deposit Account No. 18-1945, under Order No. EQLC-P01-005 from which the undersigned is authorized to draw.

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Respectfully submitted,

By 
Wolfgang Z. Stuhls

Registration No.: 40,256

ROPES & GRAY LLP

One International Place

Boston, Massachusetts 02110-2624

(617) 951-7000

(617) 951-7050 (Fax)

Attorneys/Agents For Applicant